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Leg power as a predictor of injury & illness risk in police recruits

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Introduction

- **“Emergency preparedness”:** capacity of tactical operators to complete required tasks, repeatedly, without experiencing excessive, undue stress (Peterson *et al.* 2008)
- Police officers:
  - difficulty maintaining adequate physical fitness for job demands
  - typically sit 40-50% of shift hours (McKinnon *et al.* 2011; Birzer & Craig, 1996)
- Inadequate fitness, when combined with strenuous physical activity, may result in:
  - temporary reduction in immune function (Gleeson 2007) => illness
  - injury (Pope *et al.* 2000)





Introduction

- Leg power is important to police officers for job tasks requiring, for example, sprinting, jumping, negotiating stairs, scaling structures, & conducting a resisted arrest

- Leg power is also likely to be a good indicator of exercise history & physical fitness

- On this basis, a vertical jump (VJ) test may be a useful & occupationally-relevant predictor of injury and illness risk in Police officers

Aim

To investigate the associations between *leg power*, measured by a vertical jump (VJ) test, and the incidence rates of *injury* & *illness* in new enlistees undertaking police recruit training

Methods

- Retrospective cohort study
- Non-identifiable data from prior cohort of 1021 NSW Police recruits meeting study inclusion criteria:
    - Age >18 years
    - Attending police training for first time
    - Able to complete fitness testing on first attempt
    - Full medical clearance & no injury at time of initial fitness testing
- Ethics approved by Bond University HREC, Protocol Number RO1898, with compliant consent waiver





Methods

- Fitness testing:
  - Entry fitness tests conducted prior to training, as per current Police College policy, under supervision of a NSW Police PTI
  - Included VJ assessed by countermovement jump
- Injuries & illness recorded prospectively over 12 weeks for each recruit, IAW College policy
- PTI, medical staff & data entry operators unaware of research (planned later)

Results

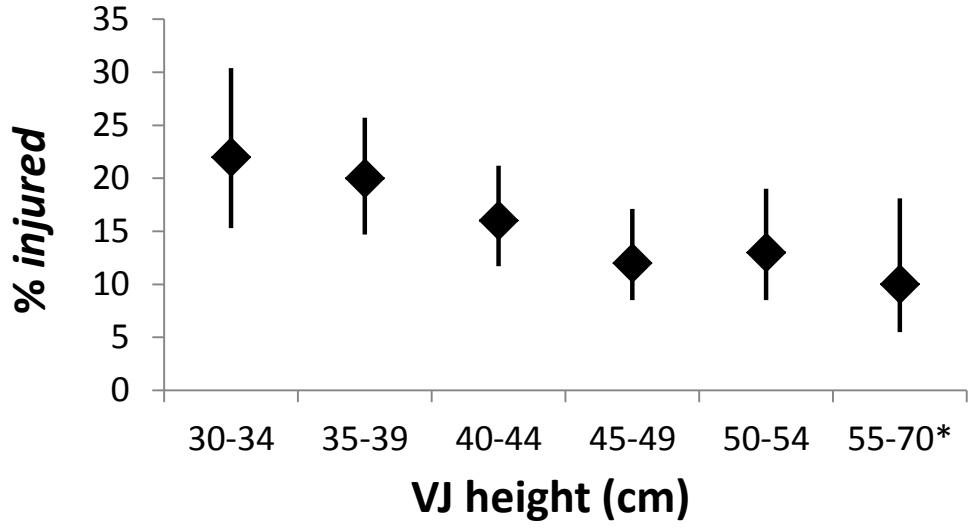
Over 12 weeks of recruit training, of the 1021 Police recruits:

- 15% (n=158) injured
- 30% (n=296) reported illness
- 38 % (n=390) presented with injury &/or illness

VJ scores ranged 30 to 68cm, Mean(SD) = 43.7 (7.6) cm

Results: *injury* vs VJ height

Percentage of Recruits *injured*, by VJ height, with 95% CI



Spearman's rank-order correlation between *injury* status & VJ score:

r_s = -.093, p = .003

* Pooled results (small cell counts)

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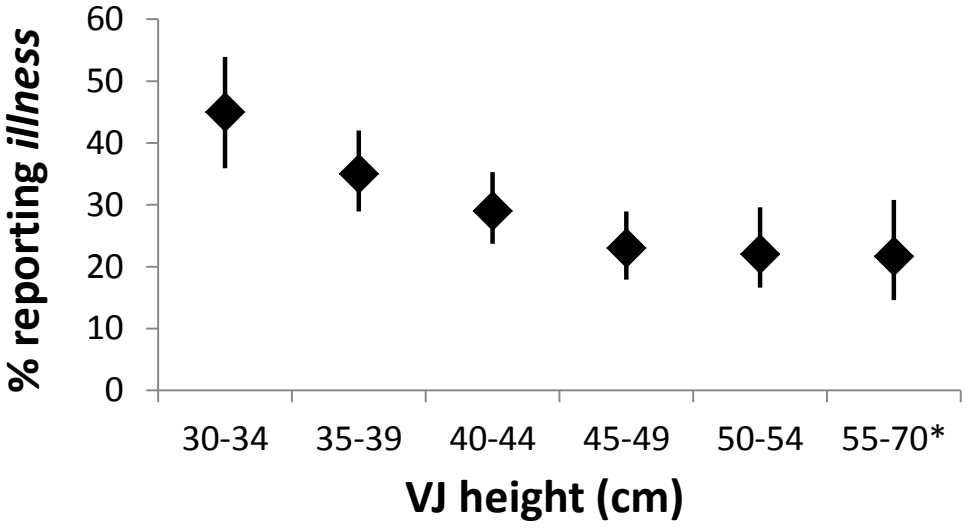
Results: *illness* vs VJ height

Percentage of Recruits reporting *illness*, by VJ height, with 95% CI



Spearman's rank-order correlation between *illness* status & VJ score:

$r_s = -.157, p < .001$

* Pooled results (small cell counts)

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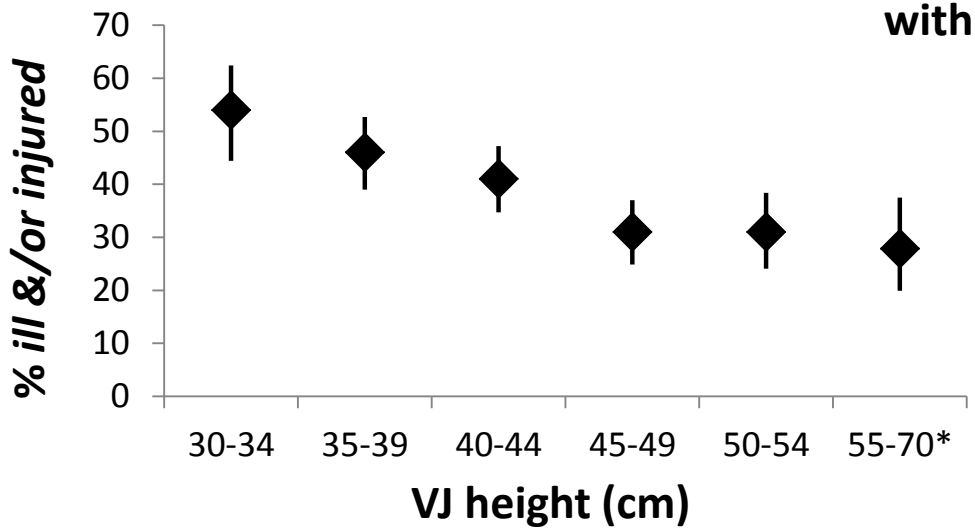
Results: *illness &/or injury* vs VJ height

Percentage of Recruits reporting *illness &/or injury*, by VJ height, with 95% CI



Spearman's rank-order correlation between *illness/injury* status & VJ score:

$r_s = -.170, p < .001$

* Pooled results (small cell counts)

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Discussion

- VJ height was significantly associated with injury & illness risk
- Leg strength/ power is a known occupational requirement for Police officers, & so the link to injury risk is unsurprising
- Such an association was not observed in a military recruit cohort, where muscular endurance instead was a significant predictor (Knapik *et al.* 2001)

Discussion

- The link to illness risk is novel, but consistent with Gleeson's (2006) suggestion that a prolonged bout of strenuous physical activity may depress immune function temporarily

- The degree to which exercise is 'strenuous' will always be dependent on level of physical conditioning, & VJ height is one indicator of that level

Discussion

- Though the associations between VJ height & both injury & illness risk were weak, the cumulative increases in risks for those with lower VJ heights, over many repeated exposures to occupational tasks, are likely to be substantial (Pope 2002)

- There appeared to be a threshold VJ height (45cm) after which injury & illness risks did not continue to increase





Discussion

- These associations do not necessarily represent cause-and-effect relationships, although this may be more likely for injury than illness
- VJ height likely indicates exercise history & physical fitness of police officers
  - Lower fitness will cause demanding occupational tasks to be experienced as strenuous, with temporary immune suppression then perhaps more likely (Gleeson 2006)
  - Lower fitness leads to earlier fatigue & increased risk of injury (Pope 2002)

Concluding Remarks

- Interesting findings but require further research to validate & elucidate

- The study setting (Police recruit training) & contrasting findings in military basic training mean caution is required in extrapolating results

Concluding Remarks

- VJ height may be a useful addition to fitness tests for tactical populations with a strong reliance on leg power, but further research is required to assess this in a multi-factor analysis

- Predictive power of VJ height may be greater in *operational* Police officers & other tactical populations with a high reliance on leg power, but this possibility needs to be tested empirically





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Questions

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